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DOI: https://doi.org/10.1177/0093650217718656

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This is a post-print version. The publisher's version is available at:

https://journals.sagepub.com/doi/full/10.1177/0093650217718656

Please cite as:

Geber, S., Baumann, E. & Klimmt, C. (2019). Where do norms come from? Peer communication as a factor in normative social influences on risk behavior. *Communication Research*, *46*(5), 708-730. https://doi.org/10.1177/0093650217718656

Abstract

This study explores the role of peer communication in normative social influences on risk behavior. We use the theory of normative social behavior (TNSB) as a guiding framework for developing a communication perspective on normative social influences. Peer communication is conceptualized as a norm-building factor and its concrete role is specified as a function of its content. The hypotheses on peer communication's impact on norms in normative social influences are tested for the case of speeding in road traffic. The analyses are based on representative survey data of 1,138 German young car drivers. Findings from mediational analyses indicate that peer communication plays a crucial role in the formation of social norms which, in turn, affect risk behavior, and that the communication's health-promoting potential depends on its content. Implications for further norm-based theory development and strategic risk communication are discussed.

Keywords: peer communication, social norms, theory of normative social behavior, risk communication, mediational analysis

Research on risk behavior has consistently found normative social influences among the most important determinants (e.g., Cialdini, Reno, & Kallgren, 1990; Rimal & Real, 2003; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Although peer communication represents one mechanism through which norms are constituted and disseminated in social groups (Real & Rimal, 2007, p. 169), little attention has been paid to its role in normative social influences on risk behavior (Mollen, Rimal, & Lapinski, 2010).

The aim of this article is to gain more insights into the relationship between peer communication, social norms, and risk behavior. For this purpose, we refer to the theory of normative social behavior (TNSB; Rimal & Real, 2005), which is the most prominent norm-based theory that takes into account peer communication in social normative influences (see also Mollen et al., 2010). The present approach elaborates a communication perspective on normative social influences (see also Geber & Hefner, 2017): Whereas the TNSB focuses on the norms' role in behavior change and on circumstances under which norms are most influential, this article provides first explanations of how norms themselves are formed through peer communication. We therefore conceptualize peer communication as a norm-building factor and specify its concrete role as a function of its behavior-related content.

The risk behavior under study is speeding among young drivers. Past research based on the TNSB has most often examined normative influences on college students' alcohol consumption (Real & Rimal, 2007; Rimal & Real, 2003, 2005; Rimal, 2008); therefore we are able to gain important insights into a different, also highly relevant risk behavior: Road traffic injuries are the leading cause of death among young people, aged 15 to 29 years (WHO, 2015, p. vii; Zhang, Fraser, Lindsay, Clarke, & Mao, 1998); speeding has been identified as the primary risk behavior leading to fatal crashes (Clarke, Ward, Bartle, & Truman, 2006; Destatis, 2015, p. 12). Thus, in virtually all countries, speeding is at the core of road safety problems and a serious risk behavior among young car drivers (WHO, 2013, p. 13).

Research on road safety indicates the importance of social norms for explaining speeding (Cestac, Paran, & Delhomme, 2011; Conner, Smith, & McMillan, 2003; Elliott, Thomson, Robertson, Stephenson, & Wicks, 2013; Scott-Parker, Watson, & King, 2009; Simons-Morton et al., 2012). However, little is known about the role of peer communication in normative social influences on speeding, as it is the case for many other risk behaviors. Understanding the role of peer communication in risk-related norm development would thus not only contribute to the theoretical understanding of normative social influences, but also reveal important starting points for peer-based intervention programs (see also Phillips, Ulleberg, & Vaa, 2011; Southwell & Yzer, 2009): Talking among peers is a potentially powerful factor in health- and risk-related decision-making (Southwell & Yzer, 2007).

Peer Communication in Normative Social Influences

Peer Communication's Role in the TNSB

The theory of normative social behavior (TNSB; Rimal & Real, 2005) has its origins in health communication and explains normative social influences on risk behavior. Peer communication was integrated 'ex post' into the TNSB (Real & Rimal, 2007). To elaborate on peer communication's role in normative social influences, we first introduce the TNSB's basic premises.

First, the TNSB addresses the conceptual ambiguity of norms and distinguishes two closely related ideas by referring to Cialdini et al. (1990): descriptive and injunctive norms. Descriptive norms are individuals' beliefs about the prevalence of a behavior within the peer group; injunctive norms refer to the perceived social approval for the behavior by relevant others. Thus, the two types of norms can be thought of as norms regarding what *is done* (descriptive) as compared to norms of what *ought to be done* (injunctive; see also Chung & Rimal, 2016; Kallgren, Reno, & Cialdini, 2000; Lapinski & Rimal, 2005; Rimal & Lapinski,

2015). Second, the TNSB is based on the idea that descriptive norms affect individuals' behaviors through interactions with three factors: injunctive norms, outcome expectations (the belief that engaging in a behavior will have positive outcomes; Bandura, 1986), and group identity (the strength of affiliation with the reference group; Tajfel, 1982). These normative factors may exert direct influence on behaviors, but they are primarily understood as moderators that heighten the influence of descriptive norms on behaviors (Rimal & Real, 2005, p. 391). Rimal and Real (2005) demonstrate that their model is able to predict 63 percent of the variance in college students' intention to consume alcohol.

Peer communication was integrated later into the TNSB as a further moderator of the relationship between descriptive norms and behavior. Real and Rimal (2007) hypothesized that peer communication increases the influence of descriptive norms on behavior and, additionally, influences risk behavior directly (p. 171). Their results reveal that frequency of peer communication about alcohol is able to explain 3 percent of the variance of college students' alcohol consumption directly and 2 percent in its moderator role and thus by its interaction with descriptive norms (Real & Rimal, 2007, p. 176).

By focusing on moderators of the relationship between descriptive norms and risk behavior, the TNSB predicts the circumstances under which norms will be most influential on risk behavior. In line with this approach, the TNSB considers peer communication as a moderator of normative influences (Real & Rimal, 2007). The present article, however, takes a different perspective on the role of peer communication, as it focuses on the question of how norms themselves are built through peer communication. In addition to the TNSB's assignment of a moderator function to peer communication, we postulate that peer communication operates as a determinant of risk-related norms (see also Geber & Hefner, 2017).

Peer Communication's Norm-Building Role in Normative Social Influences

The starting point of our argumentation is that descriptive and injunctive norms are *perceived* norms; they are individual perceptions of the reference group's norms and thus of behaviors and attitudes of relevant others (Lapinski & Rimal, 2005). For young people, the peers are the most important reference group: They share social identities and have common interests, activities, and preferences; they provide young people with a common frame of reference for understanding the world (see also Cotterell, 2007), and, thereby, are influential on social norms (Boer & Westhoff, 2006).

Interpersonal communication is one central process through which young people learn about their peer group's norms (Chung & Rimal, 2016; Hogg & Reid, 2006; Real & Rimal, 2007, Yanovitzki & Rimal, 2006). In fact, communication scholars, such as Katz and Lazarsfeld (1955), have long noted the crucial role that interpersonal communication plays in the negotiation process of social norms and in the transmission of normative information (see also Lapinski & Rimal, 2005; Southwell & Yzer, 2007).

Although the communication's basic role in normative influences is "widely recognized" in communication research (Yanovitzki & Rimal, 2006, p. 2), theoretical approaches of the interplay between communication and norms are missing (see also Yanovitzki & Rimal, 2006). In a case study on the emergence of norms, Fine (2001) conceptualizes norms as "things that can be narrated": "Just as norms can be performed, so too they can be told" (p. 157). The idea of "narration of norms" (Fine, 2001, p. 157) helps to theoretically explore the relationship between communication and norms.

Narrations of norms can be more or less explicit (see also Carcioppolo & Jensen, 2012, p. 765; Fine, 2001, p. 157). First, people can explicitly express what is and what is not normative in the group (Hogg & Reid, 2006, p. 14) by presenting models of behavior in talk and by talking about whether the behavior is socially ratified, whether it is in conformance

with group expectations (Fine, 2001, p. 157). In this vein, peer communication can be understood as a negotiation process in which reported risk behaviors and corresponding opinions are normatively evaluated. Individuals learn directly about the peers' behaviors and attitudes through peer communication and thus can infer the peers' norms from such communication (see also Rimal & Lapinski, 2015, p. 392).

Second, norms might be presented in talk rather indirectly, in terms of stories (Fine, 2001, p. 157). Actors are continually presenting narratives about the world that surrounds them (Fine, 2001, p. 157). As these stories might be taken as the reality, they provide accounts for what is and what should be (Fine, 2001, p. 161). In this case, individuals can indirectly infer the group's norms from the relevant others' stories; more concretely, they infer the norms from the peers' narrations about their behaviors and expressed opinions (Hogg & Reid, 2006, p. 15).

These considerations suggest that individuals rely on interpersonal communication to understand the prevalence, rituals, and normative acceptability of a behavior within their peer group (Chung & Rimal, 2016, p. 18; Hogg & Reid, 2006; Real & Rimal, 2007; Rimal & Real, 2003). Pointing to this *existential* importance of peer communication for the perception of social norms, we understand peer communication as a determinant of perceived norms in the context of normative influences on behaviors.

Specification and Hypotheses

The purpose of this article is to explore the peer communication's role in normative influences. Applying a communication perspective on the TNSB, we suppose that one important role of peer communication in normative social influences is the formation (development, stabilization, change) of perceived descriptive and injunctive norms. These norms in turn have influence on (risk) behavior—as assumed in the TNSB (Rimal & Real, 2005) and empirically confirmed for speeding on the road (e.g., Conner et al., 2003; Elliott et

al., 2013; Scott-Parker et al., 2009). In sum, we assume that peer communication does not directly influence risk behavior, but that its impact on risk behavior is *mediated* by social norms (Figure 1).

[Figure 1 about here]

With this reasoning, two hypotheses are formulated. The first hypothesis addresses the impact of peer communication on social norms; the second hypothesis picks up the mediating role of social norms in the relationship between peer communication and risk behavior.

H1: Peer communication has an impact on social norms.

H2: The impact of peer communication on risk behavior is mediated by social norms.

Understanding the norm-building role of peer communication requires a more detailed account than considering the mere frequency of conversations about a risk behavior (see also Rimal & Real, 2007, p. 179). Interpersonal talk about certain topics may be much more relevant for normative processing than talk about other topics. In the case of speeding, past research indicates that the content of communication correlates with risk behavior. A study by Geber, Baumann, and Klimmt (2016) demonstrates that high risk drivers primarily talk about "speeding" when they communicate with their peers about driving in general, whereas less risk-motivated drivers more often talk about topics concerning "road safety". We therefore consider not only the impact of the *frequency* of communication about driving but also the impact of specific *topics*.

According to our theoretical assumptions, peer communication can be more or less explicit about the peers' norms; it can be rather general or it can contain topics that directly refer to the risk behavior and imply explicit evaluations. In this context, Boer and Westhoff (2006) theoretically refer to communicative acts as "signaling": In conversations, peers signal their personal opinions on a specific subject, for example, by mentioning advantages or

elaborating on disadvantages (Boer & Westhoff, 2006, p. 78). Accordingly, communication topics can signal endorsement and imply *positive evaluations of risk-taking* (in the following *PERT* topics) or they can signal disapproval and *negative evaluations of risk-taking* (in the following *NERT* topics). For instance, talking about the "fun of speeding" implies positive evaluations of risk-taking and is thus categorized as PERT communication, while a conversation about the "dangerousness of speeding" signals negative evaluations of risk-taking and is hence conceptualized as NERT communication.

Following this reasoning, we differentiate the hypothesis on peer communication's impact on norms in two respects. First, we assume that conversations that contain stories of behaviors and evaluations might lead to relative concrete perceptions about the group's norms. Thus, talking about topics that are directly linked to a risk behavior might have a stronger impact on norms than general talk. More specifically, PERT communication (e.g., fun of speeding) or NERT communication (e.g., dangerousness of speeding) should have a stronger impact on descriptive and injunctive norms than the frequency of peer communication about driving in general.

H1a: The impact of PERT or NERT communication on social norms is stronger than the impact of frequency of peer communication about the general issue on these norms.

Moreover, it is highly plausible that the direction of influence of peer communication depends on the conversation's topic and thus on whether the conversation contains positive or negative signals regarding risk-taking (Boer & Westhoff, 2006). PERT communication (e.g., fun of speeding) signals that the relevant others engage in risk behavior (descriptive norm) and that the behavior is appreciated (injunctive norm); it should therefore contribute to the perception that the social norms are "pro risk". NERT communication (e.g., dangerousness of speeding), in contrast, should cause the impression that the peer group is critical of risk behavior and should thus weaken the perception of a "pro risk norm".

H1b: The impact of PERT communication on (pro risk) descriptive and injunctive norms is positive, whereas the impact of NERT communication on (pro risk) descriptive and injunctive norms is negative.

Method

Participants

To test our hypotheses on the peer communication's role in normative social influences on risk behavior, a survey among emerging adults in Germany was conducted and data on the risk behavior speeding, social norms, and peer communication were collected. The survey was part of a research project funded by the Federal Highway Institute and was operated by the Allensbach Institute of Public Opinion Research (IfD)[1]. The emerging adults were interviewed at their homes by interviewers of the IfD in May, 2012. The sample is representative for German citizens aged 15 to 24, as the interviewees were selected by quota sampling on the basis of the demographic structure of the population validated by the German Federal Statistical Office. A comparison of the sample's education with data on education of the German Federal Statistical Office (Destatis, 2016) confirms the sample's representativeness[2]. As we focus on speeding behavior, the analyses are solely based on actual car drivers aged at least 18 (N = 1,138). The average age is M = 21.44 years (SD = 1.99); gender is distributed almost evenly (53 % male).

[1] Find further information about the IfD here: http://www.ifd-allensbach.de/service/english/summary.html

[2] For this cross-validation, we used subsamples of adults aged 20 to 24 years. The comparison reveals no differences between both samples regarding the distribution across the different education levels, listed in the following: lowest formal qualification of Germany's tripartite secondary school system: current sample: 14,6 % vs. Destatis: 15,3 %; the intermediary secondary qualification: current sample: 28,9 % vs. Destatis: 28,3 %; the certificate fulfilling entrance requirements to study at a university: current sample: 46,1 % vs. Destatis: 49,7 %.

Measures

The risk behavior under study is *speeding*. Speeding was measured by a self-report question asking the emerging adults how often they break the speed limit on a five-point Likert scale ranging from 0 = *never* to 4 = *very often* (M = 1.99, SD = .96).

Descriptive and *injunctive norms* are operationalized as "pro risk norms"; the higher the value the higher the perceived risk-affinity of the peers. Descriptive norms were measured as the young drivers' perception of the prevalence of speeding among their peers (see also Real & Rimal, 2007; Rimal & Real, 2005). The respondents rated on a five-point Likert scale ranging from 0 = *almost none* to 4 = *all or almost all* how many of their friends and acquaintances drive significantly faster than is allowed (M = 2.05, SD = 1.03; see also Moan & Rise, 2011; Møller & Haustein, 2014). Injunctive norms were measured by an item representing the young drivers' perceptions about the social acceptability of speeding and thus about the peers' normative beliefs (see also Real & Rimal, 2007; Rimal & Real, 2005): "Most of my friends and acquaintances think it's okay to drive faster than is allowed." In contrast to the frequency scale for speeding and the prevalence scale for descriptive norms, a four-point Likert scale ranging from 0 = *does not apply at all* to 3 = *applies completely* (M = 1.5, SD = 0.85) was used, as a middle category could have been understood as a neutral point and the respondents were expected to be able to decide whether they agree or do not agree.

Peer communication was measured in reference to its *frequency* and to its *content*. First, emerging adults were asked how often they talk about driving and cars with their friends on the frequency five-point Likert scale ranging from 0 = *never* to 4 = *very often* (M = 2.02, SD = 1.03; see also Boer & Westhoff, 2006; Real & Rimal, 2007). Second, the peer communication's content was measured by asking the young drivers about the specific topic when they generally talk with peers about driving and cars. The respondents selected from a list of topics (e.g., fun of speeding, gas price, and dangerousness of specific roads) those

specific subtopics about which they discuss when they generally talk with their peers about driving (dichotomous scale). Principal component analyses (PCA) with varimax rotation were performed to organize the types of conversation topics based on empirical data (*KMO* = .817)[3]. The PCA resulted in three factors explaining 47 % of the variance. In line with our hypotheses, one factor represents topics that imply *positive evaluations of risk-taking* (*PERT* topics; e.g., fun of speeding, fast roads) and explains 24 % of the variance. Another factor focuses on topics signaling *negative evaluations of risk-taking* (*NERT* topics; e.g., dangerousness of specific roads, others' aggressive driving behavior; 10 % explained variance). Additionally, one factor is extracted that combines topics that are not directly linked to the risk behavior and thus do not imply any evaluation of risk-taking (e.g., car purchase and car sale, gas prices; 13 % explained variance); this factor is named *neutral* topics. Mean indices were built indicating that young drivers mostly talk about neutral (*M* = .55, *SD* = .33), less about NERT (*M* = .22, *SD* = .24) and least about PERT topics (*M* = .17, *SD* = .26).

Statistical Analysis

The statistical analysis' aim is to examine our model of the peer communication's role in normative social influences on risk behavior (Figure 1). As the analysis is based on cross-sectional data, the causal assumptions underlying our hypotheses cannot be tested strictly (e.g., Maxwell & Cole, 2007; Maxwell, Cole, & Mitchell, 2011). However, we can comprehensively analyze the relationship between communication, social norms, and risk behavior by examining correlations and partial correlations as preconditions of causality. Hence, the following statistical procedures are used to assess whether our data provide first evidence for our theoretical established causal hypotheses.

[3] 4 of 18 topics were excluded during the extraction process because of their loadings on multiple factors and their poor communalities.

To examine the hypotheses dealing with peer communication's impact on social norms (*H1*, *H1a, H1b),* we perform ordinary least square regressions and treat social norms as outcome variables. In a first regression equation, descriptive norms and in a second equation injunctive norms serve as outcome variables. To examine hypotheses *H1a* and *H1b* differentiating the impact of peer communication with regard to its content, we include the topic variables (PERT, NERT, and neutral topics) in both models next to the communication's frequency and estimate the confidence intervals of the standardized beta weights via bootstrapping. If the confidence intervals overlapped by less than 50 %, the beta weights would be considered significantly different from each other ($p < .05$; Cumming, 2009; Cumming & Finch, 2005).

In order to test hypothesis *H2*—the impact of peer communication on risk behavior is mediated by social norms—we conduct mediation analyses using Hayes' (2013) PROCESS macro[4]. Next to direct effects, the macro is able to test also indirect effects of peer communication on speeding through bootstrapping (Hayes, 2009, 2013).

Due to missing responses, data of 114 cases were excluded in a listwise deletion procedure; the final analyses are based on $n = 1{,}024$. In preliminary analyses, correlations among speeding and its predictors were examined. Table 1 displays substantial correlations between peer communication, social norms, and speeding and accordingly suggests that criteria for mediational analyses are met (see also Baron & Kenny, 1986; Hayes, 2009, 2013). The following results provide further insights into the relationship between communication, social norms, and risk behavior.

[Table 1 about here]

[4] The PROCESS macro is available under this link: http://processmacro.org/index.html.

Results

Effects of Peer Communication on Social Norms

In the first model, social norms are outcome variables and the association between peer communication and social norms is inspected (Table 2). The model demonstrates the peer communication's explanatory power with regard to social norms. Peer communication is able to explain 11 % of the variance of descriptive norms and 9 % of the variance of injunctive norms. Consequently, the results are in line with hypothesis *H1* on the peer communication's impact on social norms.

[Table 2 about here]

Moreover, we examined differences regarding the peer communication's associations with norms as a function of the communication's content. To examine *H1a* stating that the impact of the communication's content is stronger than the impact of the frequency of talk about driving, we consider the beta weights and their confidence intervals. Table 2 reveals that the *combined* correlation of PERT (positive evaluation of risk-taking) and NERT (negative evaluation of risk-taking) topics with norms is about twice as high compared to the correlation of frequency with norms—in the case of both norm components (descriptive and injunctive norms). Additionally, it was found that the beta weights of PERT communication are larger than the frequency's coefficients. However, this difference in weight is not significant: As can been seen in Figure 2, there appears to be much more than 50 % overlap in the confidence intervals of the frequency's and PERT topics' beta weights (Cumming, 2009; Cumming & Finch, 2005). To evaluate the hypothesis more precisely, half of the average of the overlapping confidence intervals was calculated (.038) and added to the PERT topics lower bound estimate, which yielded .174 (in the model for descriptive norms) and .138 (in the model for injunctive norms). As the frequency upper bound estimates of .238 (in the

model for descriptive norms) respectively .22 (in the model for injunctive norms) exceed the corresponding benchmarks of .174 and .138, the difference between the frequency and PERT topics beta weight is not statistically significant. Consequently, *H1a* cannot be confirmed.

Moreover, we analyzed differences in the relationship direction between PERT and NERT topics. Our results corroborate our hypothesis *H1b* and reveal that communication about PERT topics is associated positively with the perceived "pro speeding norm", while conversations about NERT topics are correlated negatively with risk-friendly social norms. In the case of descriptive norms, the pro-risk correlation of PERT topics is much stronger than the risk-reducing correlation of NERT communication; in the case of injunctive norms, both effect sizes are comparable.

In sum, the first regression model provides first evidence for our key proposition of peer communication as a factor in the formation of risk-related norms.

Effects of Peer Communication on Risk Behavior via Social Norms

In the second model (Table 3), not social norms but risk behavior is the outcome variable in order to examine if peer communication's correlation with risk behavior is mediated by social norms (*H2*).

[Table 3 about here]

Peer communication is able to explain 14 % of the risk behavior speeding (total effect). In order to prove if the communication's correlation with speeding is mediated by social norms, we integrate descriptive and injunctive norms into the model. The results show that descriptive and injunctive norms are able to explain 23 % of the variance of speeding. Moreover, these results corroborate the mediational role of social norms in the relationship between peer communication and risk behavior: all but one regression coefficients of peer communication drop to zero when controlling for social norms. Only the association between

PERT (positive evaluation of risk-taking) topics and risk behavior remains significant and substantial when integrating the mediators.

Next to the total and direct effects, we also consider the indirect effect of peer communication on speeding (Table 4). Except for neutral topics, the indirect effects of peer communication on risk behavior are significant. The single beta coefficients indicate rather small associations; but taken together, the indirect effects of peer communication are able to explain 7 % of the variance of speeding[5]. These results support the idea of mediational processes between peer communication, social norms, and risk behavior. The relatively small single correlations can be attributed to the conservative procedure of including all peer communication variables simultaneously in the model; thus, the coefficients represent the indirect correlations that are unique to each peer communication variable (see also Hayes, 2013, p .195).

[Table 4 about here]

To summarize, the results are in line with the mediational hypothesis and suggest that the peer communication's association with risk behavior is mediated by social norms. However, the findings do not reveal total mediation by social norms, indicating that further mediational mechanisms seem to play a role in peer communication effects on risk behavior.

Discussion

Peer Communication's Role in Normative Social Influences

The study's mission was to gain more insights into the relationship between social norms, peer communication, and risk behavior. We referred to the theory of normative social behavior (TNSB; Rimal & Real, 2005), the most prominent norm-based theory that takes into

[5] In total, peer communication is able to explain 14 % of the variance of risk behavior. We portioned this explained variance to the direct and indirect effects by considering the beta coefficients of all effects.

account peer communication in social normative influences (see also Mollen et al., 2010). However, in contrast to the TNSB, we did not focus on the role of norms in behavior change, but applied a communication perspective to examine the role of peer communication in norm-building processes (see also Geber & Hefner, 2017). To comprehensively understand peer communication's role in normative social influences on risk behavior, we made differentiations in reference to the conversations' specific content (i.e., positive evaluation of risk-taking (PERT), negative evaluation of risk-taking (NERT), and neutral topics). We tested our hypotheses for the case of speeding among young drivers and based our analysis on survey data representative for German drivers aged 18 to 24.

As we have based our analysis on cross-sectional data, the theorized causal assumptions cannot be proved strictly. However, our results provide initial evidence for our model of peer communication's role in normative social influences in most instances (Figure 1). First, the findings indicate the influential role of peer communication in the formation process of social norms as it is able to explain about 10 percent of the variance in social norms. Second, our results show that the differentiation of peer communication is highly useful. The perception of social norms is better explained by peer communication's concrete content than by the mere frequency of talk about driving, albeit the detected differences between the frequency and the content effect sizes are not statistically significant. Additionally, the direction of peer communication's relationship with social norms depends on its content; talking about topics that imply positive evaluations of risk-taking (PERT topics) strengthens a perceived "pro speeding norm", whereas conversations about topics signaling negative evaluations of risk-taking (NERT topics) weaken risk-friendly social norms. Third, our findings demonstrate that a great extent of peer communication's association with risk behavior is mediated by social norms; the effect of all but one of the

communication variables on risk behavior vanished when integrating social norms into the model.

There are some results that do not conform to our hypotheses and generate challenges for further theoretical reasoning. Indeed, peer communication is able to explain about one tenth of the variance in social norms; however, this means at the same time that about 90 percent in the variance of the young drivers' normative perceptions have to be attributed to other mechanisms than communication. According to the social cognitive theory (Bandura, 1986), the formation process of normative beliefs can result from observing relevant others. Observational learning might be a particular relevant mechanism when the risk behavior is enacted in social contexts. Research indicates that speeding is a risk behavior that takes place in social settings as "cars and driving" play a crucial role for the peer group's identity, particularly for the peer groups of risk drivers (e.g., Gregersen & Berg, 1994; Holte, 2012; Schulze, 1990). Therefore, it is possible that especially young drivers' social norms toward speeding are constructed and shaped by direct observations of their peers' driving behavior and the other peers' reactions toward this behavior in a social situation. An alternative explanation for the limited association between peer communication and norms is methodology: The self-report of frequencies and content of peer communication used in the present study and adopted from past TNSB research may return biased responses that could cause underestimations of peer communication's actual correlations with norms (see, for instance, Greenberg et al. (2005) for a discussion of the validity of self-reports of media use, which is comparable to self-reports of peer communication).

Our results reveal that the integration of the peer communication's content is a useful addition to its frequency (see also Real & Rimal, 2007, p. 179). However, even when controlling for its content, the communication's frequency is still substantially associated with social norms indicating that talking about driving in general and independently from the talks'

specific topic is able to strengthen "pro risk norms". This finding might be explained by a "normative agenda-setting effect" of peer communication: The mere salience of the issue driving in the peer group's communication might be an indicator for individual drivers that their peers' affinity to the topic also refers to risky driving and thus they might expect their peers to have positive attitudes toward speeding. Future research will require a greater resolution in assessing details of interpersonal talk and its content to better explain the obtained relationship between communication frequency and social norms.

Our results suggest that the peer communication's impact on risk behavior is only partially mediated by social norms. There is one factor that seems to be of substantial importance for risk behavior: PERT communication, that is, communication about topics that imply positive evaluations of risk-taking. We assume that there might be additional mediational mechanisms next to social norms that could explain the remaining ("direct") effect of peer communication on risk behavior. To elaborate on such mediational mechanisms, we refer to the TNSB as it proposes further social cognitive factors beyond perceived social norms that we did not consider in our study, that is, outcome expectations und group identity (see also Figure 1). These social cognitive factors might also serve as *mediators* of peer communication's influence on risk behavior. For instance, PERT communication might lead to the perception that speeding with friends is rewarding, pleasurable, enjoyable, and fun (Real & Rimal, 2007, p. 173). These outcome expectations, in turn, might influence risk behavior.

Theoretical Implications

For the purpose of this study, the theory of normative social behavior (TNSB; Rimal & Real, 2005) turned out to be beneficial, particularly in two ways. First, the TNSB establishes the conceptually important distinction between injunctive and descriptive norms. Second, the TNSB is the most prominent norm-based theory that considers the importance of

peer communication in normative social influences (Real & Rimal, 2007; see also Mollen et al., 2010, p. 546). Therefore, the TNSB served as an important starting point for applying a communication perspective on normative social influences on risk behavior and for exploring peer communication as a norm-building factor. Further theory development should be based on peer communication's role in norm-building and should moreover take up the idea of peer communication as one element in a more complex system of variables that (interactively) trigger risk behavior; in this way, the theoretical and practical potential of peer communication can be fully uncovered.

On the theoretical level, the conceptualization of peer communication as a determinant of individuals' perceptions helps to fill the conceptual gap between the individual and his or her group (see also Geber & Hefner, 2017; Yanovitzky & Rimal, 2006; Rimal et al., 2013). According to our theoretical explanations, peer communication is a social interactional variable that represents the individual's interactions with his/her group. In this vein, peer communication links the notion of social influence (Rice, 1993) referring to the relevant others' actual behavior and attitudes on the one hand and the idea of normative influence referring to social perceptions on the other hand (Rimal & Real, 2003); and it connects the idea of "collective norms" (Lapinski & Rimal, 2005; Rimal & Lapinski, 2015; referred to as "actual norms" by Berkowitz, 2004, or "group norms" by Hogg & Reid, 2006) that operate at the level of the social system with perceived norms theorized at the individual, psychological level. This might help to reflect on possible discrepancies between the actual social reality and the individual's perception of this reality, and the effect of peer communication on such discrepancies. For instance, the social norms approach (Berkowitz, 2004; Perkins & Berkowitz, 1986) refers to the gap between "perceived" and "actual norms" as a "misperception" that affects risk behavior (Berkowitz, 2004, p. 5). Peer communication might play an important role within the formation process of these misperceptions.

Practical Implications

In accordance with the idea of the two step flow of communication (Katz & Lazarsfeld, 1955; Lazarsfeld, Berelson & Gaudet, 1944), peer communication may function as a link between a prevention campaign and its outcomes (see also Hwang, 2009; Southwell & Yzer, 2007, 2009). The notion of peer communication as a causal factor of social norms refers to promising starting points for communication campaigns addressing social norms (Berkowitz, 2004). Our results suggest that the effectiveness of social norms campaigns might be heightened if peer communication is—according to its conceptual understanding as an impact factor—integrated in the campaign's strategy as a dissemination channel (see also Hwang, 2009, Rimal et al., 2013; Southwell & Yzer, 2007, 2009). Peer communication can serve as a dissemination pathway for the campaign through which the reach might be multiplied by the peers' network (Southwell & Yzer, 2007, p. 440). Moreover, campaign-induced discourse among peers might enhance the message's credibility and authenticity (Lazarsfeld et al., 1944, p. 152) as well as might hinder the social formation of unfavorable norms and help on discovering beneficial norms (Southwell & Yzer, 2007, p. 440). However, referring to our findings, we also have to set limits on peer communication's potential (see also Holtzmann & Rubinson, 1993; Hwang, 2009). Our results reveal that the potential of peer communication as a dissemination channel that reduces "pro risk norms" and leads to less risk behaviors is only valid for communication about topics that imply negative evaluations of risk-taking and that talking with peers is able to increase "pro risk norms" for the most part (see also Holtzmann & Rubinson, 1993). Not only communication that explicitly evaluates risk-taking positively has a striking impact on risk-friendly social norms and risk behavior, but also the mere frequency of peer communication about driving in general is able to strengthen "pro risk norms" and thus to enhance the likelihood of performing risk behavior. Consequently, if the intervention strategy fails at initiating risk-

sensitive talk among peers, there is an actual danger that the campaign accidentally enforces risk behavior (boomerang effect; see also Hovland, Janis, & Kelly, 1953; Hwang, 2009)

In sum, we suggest that further theory development should be based on the understanding of peer communication as a norm-building factor that links individuals' perceptions to the social reality of their peer groups. Such a theory of communicative normative influences might help to understand which role peer communication plays within social normative influences on risk behavior and might refer to important starting points for the development of communication strategies and intervention programs.

Limitations and Future Research

There are particularly three aspects that limit our results and the validity of our interpretations. The first and most crucial limitation regarding the study's validity is that our theoretical argument follows the idea of a mediational process, but our cross-sectional data actually do not allow testing for causality. Causal assumptions cannot be definitely supported empirically unless the conditions of causality have been met by corresponding research designs, that is, longitudinal and experimental studies (Hayes, Preacher, & Myers, 2011, p. 436). Therefore, our cross-sectional results only provide limited evidence for our theoretical assumptions, and follow-up research is needed to prove the current findings in the sense of causal effects between communication, norms, and risk behavior. For instance, future research could employ panel data on peer communication, social norms, and risk behavior to test the directions of influence suggested by our model (see also Baumgartner, Valkenburg, & Peter, 2011).

Second, our analysis is mainly based on single-item measures. The validity of single items in contrast to multi-item measures has been questioned, especially with respect to psychological attributes, as items might go along with measurement errors (Nunnally & Bernstein, 1994, p. 67) and may be unable to fully represent a complex theoretical concept

(McIver & Carmines, 1981, p. 15). However, we assume that the items used in this study are able to represent the corresponding concepts adequately as descriptive and injunctive norms represent one concrete facet of a more complex concept (i.e., social norms). Asking the respondents for the perceived prevalence of the behavior among their peers and the perceived peers' attitudes is the most adequate direct measurement for descriptive and injunctive norms (see also Rimal & Real, 2005; Real & Rimal, 2007). But of course, the present study design needs to be considered with regard to possible measurement errors.

The third limitation refers to the measurement of peer communication. Our theoretical argumentation is based on the assumption that peer communication is not a cognitive variable, but a social interactional one that connects the individual to its group. However, our measurements do not reflect the differentiation between behavioral and cognitive variables. By basing data collections solely on survey methods, all variables are conducted by self-reports and thus represent cognitive perceptions. The use of survey methods to assess behavior is widespread in research, but also critically discussed (e.g., Baumeister, Vohs, & Funder, 2007; Greenberg et al., 2005; Southwell & Yzer, 2007, 2009). In this study, the problem is all the more significant as our model of peer communication's role in normative social influences is based on constitutional differences between peer communication as a behavioral variable and norms as cognitive variables; consequently, the applied measurement of peer communication limits the validity of our findings. Future research examining the relationship between communication and norms should be based on multi-method approaches and combine observation and survey methods (Baumeister et al., 2007).

Next to these methodical limitations, there are limits on the study's scope due to the specification of the research object. First, we focused on communication with peers as the peers are the most important reference group for young people. Peers were operationalized as friends and acquaintances, thus as rather strong ties (see also Haynie, 2002; Jaccard, Blanton,

& Dodge, 2005). However, the term peers is used as a "very broad catch-all concept" (Festl, Scharkow, & Quandt, 2014, p. 7) that also includes people of the same age. Moreover, there are further reference groups that exert normative social influences on young people's risk behavior, most importantly, parents (Boer & Westhoff, 2006; Holtzmann & Rubinson, 1993; Powell & Segrin, 2004). Thus, future studies might compare the communicative influence of different reference groups, such as friends, people of the same age, and parents (see also Holtzmann & Rubinson, 1993; Powell & Segrin, 2004).

Second, the peer communication's role in normative influences was studied in the case of speeding. According to the attribute-centered approach (Rimal, Lapinski, Turner, & Smith, 2011), the influence of social norms on behaviors and subsequently also the peer communication's role in normative social influences depends on the underlying properties of behaviors ("behavioral attributes"), for example, whether the behavior is characterized by social attributes. Rimal et al. (2011) expect behaviors performed in social settings to be under greater normative influences, in comparison to risk behaviors enacted in private settings and in the absence of others (see also Rimal & Lapinski, 2015, pp. 401–402). Consequently, our empirically demonstrated relationships between communication, social norms, and risk behavior should be examined also for other risk behaviors that might be characterized as more social than speeding—for instance, drinking behavior of college students (e.g., Rimal & Real, 2003, 2005) or driving after drinking (e.g., Kenney, LaBrie, & Lac, 2013)—or more private, such as risky sex behavior (e.g., Boer & Westhoff, 2006; Holtzmann & Rubinson, 1993; Rimal et al., 2013), or risky sexual online behavior (e.g., Baumgartner et al., 2011).

The previous section theorized on peer communication as a connection between actual group norms and individual's perceptions of norms. In order to empirically examine this assumption, data not only on the individual's perceptions of social norms and her/his peer communication, but also on behaviors and attitudes of the peer group members are required

(e.g., Festl et al., 2014). Moreover, data on social groups would also allow taking social structures and dynamics into account. These steps might provide further important insights in the peer communication's role in normative social influences.

In this study, we were able to point to one possible account of peer communication's role in normative social influences on (risk) behavior and to demonstrate that "understanding the role of communication in normative influence can help remove much of the ambiguity about mechanisms and processes of normative influence" (Yanovitzky & Rimal, 2006, p. 2). However, in order develop a single, coherent theoretical approach of the peer communication's role in social and normative influences, further research is necessary.

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Figure 1

The Hypothesized Role of Peer Communication in Normative Social Influence

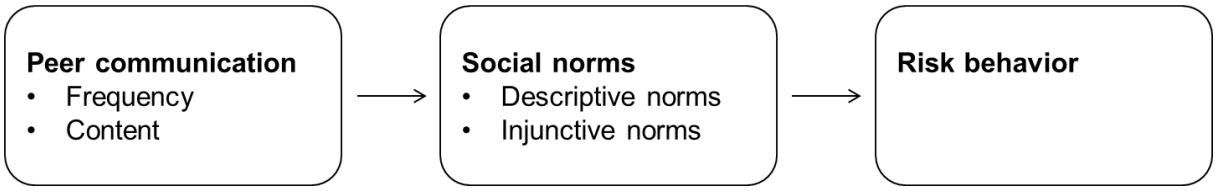


Table 1

Pearson Correlations among Speeding and Predictors of Speeding

	Speeding	**Descriptive norms**	**Injunctive norms**	**Frequency of communication**	**Neutral communication**	**PERT communication**	**NERT communication**
Speeding	1.00***						
Descriptive norms	.558***	1.00***					
Injunctive norms	.413***	.493***	1.00***				
Frequency of communication	.282***	.258***	.236***	1.00***			
Neutral communication	.185***	.165***	.167***	.597***	1.00***		
PERT communication	.346***	.287***	.254***	.563***	.442***	1.00***	
NERT communication	-.042	-.039	-.075*	.195***	.253***	.123***	1.00***

Note. N = 1,024 (listwise deletion of cases); ***p < .001, **p < .01, *p < .05; PERT = positive evaluation of risk-taking, NERT = negative evaluation of risk-taking

Table 2

Effects of Peer Communication on Descriptive Norms and Injunctive Norms

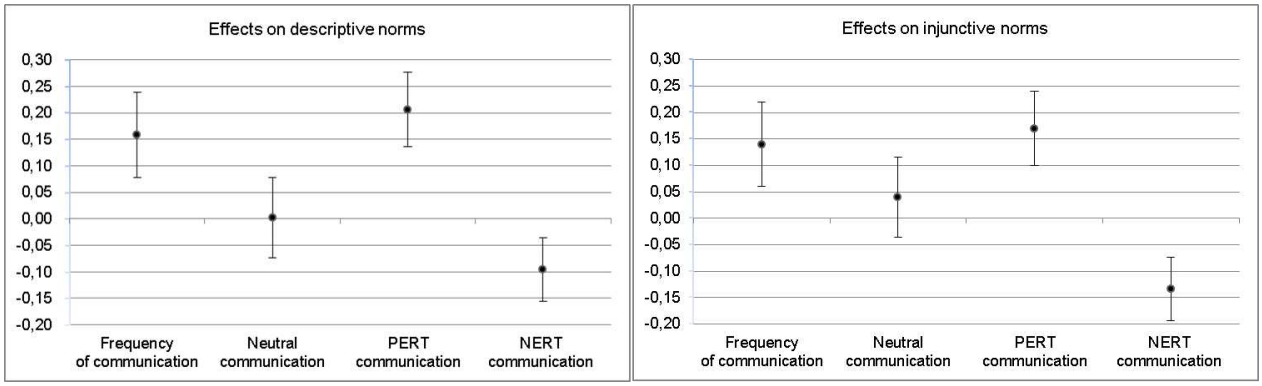
	Descriptive norms			**Injunctive norms**		
	β	*p*	95% CI	*β*	*p*	95% CI
Frequency of communication	.158	.000	[.078, .238]	.14	.001	[.060, .220]
Neutral communication	.002	.951	[-.074, .078]	.040	.297	[-.036, .116]
PERT communication	.206	.000	[.136, .276]	.170	.000	[.100, .240]
NERT communication	-.096	.002	[-.156, -.036]	-.133	.000	[-.193, -.073]
	R^2 = .105			**R^2 = .094**		
	F(4, 1019) = 29.888 , p =.000			**F(4, 1019) = 26.438 , p =.000**		

Note. N = 1,024 (listwise deletion of cases); β = standardized coefficients (beta weights);

PERT = positive evaluation of risk-taking, NERT = negative evaluation of risk-taking

Figure 2

Confidence Intervals of the Peer Communication's Effects (Beta Weights) on Descriptive and Injunctive Norms



Note. Figures display 95 % confidence intervals [95% CIs] of the peer communication's beta weights; PERT = positive evaluation of risk-taking, NERT = negative evaluation of risk-taking

Table 3

Total and Direct Effects of Peer Communication on Risk Behavior

	Risk behavior (Total effects of peer communication)		**Risk behavior (Direct effects of peer communication)**	
	ß	*p*	*ß*	*p*
Peer communication				
Frequency of communication	.146	.000	.059	.089
Neutral communication	.003	.932	-.004	.908
PERT communication	.270	.000	.158	.000
NERT communication	-.105	.001	-.045	.086
Social norms				
Descriptive norms			.423	.000
Injunctive norms			.147	.000
	R^2 = .142		**R^2 = .371**	
	$F(4, 1019) = 41.985, p = .000$		**$F(6, 1017) = 99.743, p = .000$**	

Note. N = 1,024 (listwise deletion of cases); *ß* = standardized coefficients (beta weights);

PERT = positive evaluation of risk-taking, NERT = negative evaluation of risk-taking

Table 4

Indirect Effects of Peer Communication on Risk Behavior

	Risk behavior (Indirect effects of peer communication)	
	β	*p*
Frequency of communication		
Mediator: descriptive norms	.067	.000
Mediator: injunctive norms	.021	.005
Neutral communication		
Mediator: descriptive norms	.001	.951
Mediator: injunctive norms	.006	.316
PERT communication		
Mediator: descriptive norms	.087	.000
Mediator: injunctive norms	.025	.001
NERT communication		
Mediator: descriptive norms	-.041	.002
Mediator: injunctive norms	-.020	.001

Note. N = 1,024 (listwise deletion of cases); β = standardized coefficients (beta weights);

PERT = positive evaluation of risk-taking, NERT = negative evaluation of risk-taking